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ABSTRACT

A 1974 Office of Demographic Studies-Gallaudet College study on hearing aid use surveyed 997 hearing-impaired students in special education programs across the United States. The extent of hearing aid use was examined in three contexts: classroom, school outside the classroom, and home or dormitory. Overall, 78% of the students were reported to wear a hearing aid at least some of the time. Whether and in what situations they were reported to wear the aid, as well as the type of aid worn, were found to be related to nine separate variables: degree of hearing loss, age, sex, type of special educational program, hearing status of parents, family income, ethnic background, cause of hearing loss, and age at onset of hearing loss. (Appended are a report on the Office of Demographic Studies, Gallaudet College; copies of survey questionnaires; and a list of schools participating in the study). (Author/DLS)

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THE USE OF HEARING AIDS BY HEARING IMPAIRED STUDENTS IN THE UNITED STATES

Michael A. Karchmer
Linda A. Kirwin

DATA FROM THE ANNUAL SURVEY OF HEARING IMPAIRED CHILDREN AND YOUTH

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ABSTRACT

In spring, 1974, the Office of Demographic Studies conducted a survey of 997 hearing impaired students in special educational programs across the United States. This study reports the information from that survey pertaining to hearing aid use and its relationship to important personal and educational characteristics of hearing impaired students. The extent of hearing aid use is considered in three separate contexts: in the classroom, at school outside the classroom, and at home or in the dormitory. Overall, 78% of the students were reported to wear a personal hearing aid at least some of the time. Whether and in what situations students were reported to wear an aid, as well as the type of aid worn (monaural, binaural, or y-cord), were found to be related to nine separate variables: degree of hearing loss, age, sex, type of special educational program, hearing status of parents, family income, ethnic background, cause of hearing loss, and age at onset of hearing loss.

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The Use of Hearing Aids by Hearing Impaired Students in the United States

Michael A. Karchmer
Linda A. Kirwin

BACKGROUND AND METHODOLOGY

In 1969 the Office of Demographic Studies (ODS) began a national achievement test program to describe certain important features of the special educational experience of hearing impaired students across the United States. The culmination of this effort was the development and standardization by the ODS of a special edition of the 1973 Stanford Achievement Test appropriate for hearing impaired students. This standardization was achieved by selecting a 20% national stratified random sample of special educational programs for hearing impaired children from across the United States (151 programs with a total of 10,509 students). The special edition of the Stanford was then administered to all the students age 8 and above in as many of these programs as would participate (6,781 students from 119 programs; see Appendix 5 for list of these programs). The test results for each student, when paired with that individual's file of demographic and related information from the 1973-74 Annual Survey of Hearing Impaired Children and Youth (see Appendices 1 and 2), formed the data base from which national achievement norms for hearing impaired students were developed.

The national sample of 10,509 students selected for the standardization of the achievement test also formed a pool of students for further research. When the achievement tests were administered in spring, 1974, questionnaires were sent to the classroom teachers and parents of a 13% random subsample of these students. This questionnaire information and the data obtained on each of these students from the 1973-74 Annual Survey of Hearing Impaired Children and Youth are the bases for this report.

A copy of a "Special Studies Questionnaire" was sent to the classroom teacher of each student selected in the 13% subsample described above. The survey questions were wide-ranging and included items requesting information on hearing aid usage, communication methods in the classroom, and other educational data not obtained in the Annual Survey. Only the information dealing with hearing aid usage is reported in this paper, and this portion of the questionnaire is reprinted as Appendix 3.

The survey was sent by affixing a label containing a student's name or school identification code number to a copy of the questionnaire. This form was mailed to the administrative head of the school or program with the request that it be forwarded to the classroom teacher of the student. If the student had more than one teacher, the teacher who was thought to have the best knowledge of the student was to be selected. The teacher then completed the form and returned it directly to the Office of Demographic Studies. Although proximity to the end of the school year limited the possibility of extensive follow-up efforts, telephone follow-up was conducted several weeks after the initial mailing. Altogether, 1,362 forms were distributed to the teachers of students in the subsample; 997 were returned, a response rate of 73%.

Since the response rate was not 100%, the question of the representativeness of the available subject pool must be answered. The demographic characteristics of the 997 students were compared to those of the national group of 43,794 hearing impaired students in the 1973-74 Annual Survey. The 1973-74 Annual Survey, it should be noted, contains information on about 80% of all hearing impaired students known to be in special education programs in the United States at that time. In later sections of this report, various characteristics of this sample of 997 students are discussed in comparison with the much larger Annual Survey sample. Apart from the exceptions to be noted, the two groups correspond closely, so that the 997 students described here can in fact be seen as representative of the national population of hearing impaired students in special educational programs in the United States.

At the same time that the teacher questionnaire was sent out, a "Family Questionnaire" was sent to the parents or guardians of each student in the 13% sub-

sample, the same students on whom information in the "Special Studies Questionnaire" was requested from the classroom teacher. Although this survey dealt with topics ranging from communication methods used at home to characteristics of siblings in the family, only the responses having to do with family income are dealt with in this report (Appendix 4).

The 1,362 family survey forms were distributed in similar fashion to the "Special Studies Questionnaire" forms. Each form and a number of other materials, including an explanatory cover letter and a postage-paid return envelope, were placed in a prepaid mailing envelope and sent to the administrative head of the program in which the student was enrolled. The administrator then addressed the envelope to the parents of the student—since the ODS does not have information on parental names or addresses—added any further explanation desired, and sent it to the parents. The parents completed the forms and returned them directly to the ODS. A limited amount of follow-up was done by telephone to the administrative head of the program. Of the 1,362 questionnaires addressed to the parents of the students in the subsample, 787 usable responses (58%) were returned. Six hundred and fifty-eight of the 787 also had data from the "Special Studies Questionnaire" addressed to the teachers and these are considered in the section on family income in this report.

OVERALL ESTIMATES OF HEARING AID USE

The determination and classification of hearing aid users were based on the responses by the teachers to these three general questions:

1) Does the student use a hearing aid (personal/group) in the classroom?
2) Outside the classroom, but while at school, how often does the student use a personal hearing aid (excluding inappropriate times such as football, swimming, etc.)?
3) At home or in the dormitory, to your knowledge, how often does the student use a personal hearing aid (excluding inappropriate times such as sleeping, etc.)?

The possible responses for the second and third questions were: never (less than 10% of the time), sometimes (10-50%), usually (51-90%), and always (91-100%).

The first question was to be answered "yes" or "no," with a "yes" answer followed by two further responses: the first showing the total number of hours per day the student was in class, the other giving the number of hours the student used an aid in a classroom situation. From these responses the percentage of the total time spent in class for wearing of an aid was derived for each student. For purposes of comparison, these percentages were then categorized according to the same ordinal scheme as the other two questions. The frequency distributions for each question are presented in Tables 1, 2, and 3.

TABLE 1: NUMBER AND PERCENT DISTRIBUTION OF EXTENT OF PERSONAL AND GROUP HEARING AID USE IN THE CLASSROOM

Extent of Use	N	%	% (Adjusted for Non-response)
Never	201	20.2	21.3
Sometimes	24	2.4	2.5
Usually	82	8.2	8.7
Always	635	63.7	67.4
No Response	55	5.5	—
Total	997	100.0	100.0

TABLE 2: NUMBER AND PERCENT DISTRIBUTION OF PERSONAL HEARING AID USE AT SCHOOL BUT OUTSIDE THE CLASSROOM

Extent of Use	N	%	% (Adjusted for Non-response)
Never	284	28.5	29.8
Sometimes	85	8.5	8.9
Usually	122	12.2	12.8
Always	463	46.4	48.5
No Response	43	4.3	—
Total	997	100.0	100.0

TABLE 3: NUMBER AND PERCENT DISTRIBUTION OF PERSONAL HEARING AID USE AT HOME OR IN THE DORMITORY

Extent of Use	N	%	% (Adjusted for Non-response)
Never	279	28.0	30.8
Sometimes	135	13.5	14.9
Usually	170	17.1	18.8
Always	321	32.2	35.5
No Response	92	9.2	—
Total	997	100.0	100.0

In order to give an overall profile of hearing aid use for the sample, the possible answers for the three questions were dichotomized, so that the "never" response was coded "no"; "sometimes," "usually," and "always" were coded "yes." This information was then combined into categories according to which of the three contexts was reported for aid use (in the classroom, at school outside class, at home or dormitory). As is shown in Table 4, of the 997 total for this variable there are 106 cases where information regarding at least one of the three contexts was not supplied. Of the 891 reported cases, almost 82% of the students were reported to wear an aid of some kind at least part of the time.

If the three contexts for using an aid are viewed in all possible combinations, there are eight possible categories of hearing aid use. Table 4 indicates that all eight such categories occur in the sample. It is interesting to note, however, that 92.3% of all reported cases are accounted for by only three of the categories: 1) "Yes" answers to all three questions, i.e., indicating some hearing aid use in class, at school outside of class, and at home/dormitory (65.5% of the reported cases); 2) "No" answers to all three questions, making them non-users in any of the above situations (18.2%); and 3) students reported to wear an aid in a classroom situation only (8.6%). On the other hand, several of the categories rarely occur, notably the "home/dormitory only" category. Only four students in the entire sample (0.4%) were reported as wearing an aid at home or in the dormitory, but in neither school situation.

TABLE 4: DISTRIBUTION OF HEARING AID USE AS A FUNCTION OF PLACE OF USE: CLASS, AT SCHOOL OUTSIDE THE CLASS, AND AT HOME OR IN THE DORM

Place of Use	N	%	% (Adjusted for Non-response)
Class, School & Home	584	58.6	65.5
Classroom & Home/ Dormitory	20	2.0	2.2
Classroom & School Outside of Class	32	3.2	3.6
School Outside of Class & Home/ Dormitory	10	1.0	1.1
Classroom Only	77	7.7	8.6
School Outside of Class Only	2	0.2	0.2
Home/Dormitory Only	4	0.4	0.4
Non-User	162	16.2	18.2
Some Information Missing	106	10.6	—
Total	997	100.0	100.0

Since the focus of this study is to characterize the variables that are associated with the predominant patterns of hearing aid use, and since the vast majority of people in this sample fall into the three classifications noted above, a slightly simpler variable has been selected as the major index of hearing aid use. This variable evolves from the combinations of the response to the two questions regarding classroom use (yes/no) and home/dormitory use (yes/no). Four categories result: 1) both classroom and home/dormitory use; 2) classroom use only; 3) home/dormitory use only; and 4) neither classroom nor home/dormitory use. Table 5 shows the relative distribution of students who fall into each of the four categories, and it is this breakdown that is used in the next section of the report. However, because so few students fall into the category who wear an aid at home/dormitory but not in the classroom, this group will not be discussed further.

TABLE 5: DISTRIBUTION OF HEARING AID USE AS A FUNCTION OF SITUATIONS OF REPORTED USE

Situation of Use	N	%	% (Adjusted for Non-response)
Both Class & Home	609	61.1	68.7
Class Only	109	10.9	12.3
Home Only	4	0.4	0.5
Neither Class Nor Home	164	16.4	18.5
Some Information Missing	111	11.1	—
Total	997	100.0	100.0

The differences that result from using this four-category variable in place of the more complete eight-category variable (that includes all three responses) are minimal. The overall effect is: (a) to combine the 20 students who fall into the classroom and home/dormitory use category with the 584 students in the class, at school outside of class, and home/dormitory category; (b) to combine the 32 students who wear an aid in class and at school outside class (but not at home) with the 77 who wear an aid in class only; and (c) to drop from further study the remaining 16 students who fall in the three most rarely occurring categories (see Table 4). The resulting variable can be seen as defining three sorts of students: students who wear an aid to some degree both in and out of school; students who use an

aid only in a classroom situation; and students who do not use an aid at all.

PERSONAL AID USE

The term "hearing aid" in this report refers to any of a wide range of amplification devices. It includes both group and personal aids. Table 6 shows for those students who were reported to wear an aid whether the aid worn in the classroom was a personal or a group aid. Of the 81.8% of the total sample who were reported to wear an aid, nearly all wore a personal aid at least part of the time. Those who were reported as making some use of a group aid were also reported as wearing a personal aid as well—either by wearing a group aid only in class and personal aid in another situation or a combination of a group and personal aid in the classroom situations. Only 33 students, or 4.55% of the 725 students wearing aids for whom all relevant information was given, reported using a group aid exclusively. Altogether, 78% of the total sample were reported as wearing a personal aid.

Table 7 shows the type of aid used for the students who were reported to wear a personal aid. A *monaural* aid is considered to be a single instrument (microphone, amplifier, batteries), either head-mounted or worn in the clothing, with the receiver in one ear. A *y-cord* or pseudobinaural aid typically refers to an instrument worn in the clothing with a receiver in each ear. A *binaural* aid consists of separate instruments for each ear and mounted apart on the chest or in the temples of spectacles or behind the ears (Davis and Silverman, 1970).

The type of personal aid worn is a factor related to several other variables: age, degree of loss, ethnic group, income, cause of deafness, and type of educational program. These relationships are each discussed later in the paper.

TABLE 6: TYPE OF AID USED IN CLASS AS A FUNCTION OF SITE OF REPORTED USE

Site of Reported Use	Group Aid Only	Personal Aid Only	Both Group and Personal	Total
Class, School & Home	73	437	73	583
Class & Home	9	8	2	19
Class & School	12	19	1	32
Class Only	33	30	12	75
Total	127	494	88	709
Percentages	17.9%	69.7%	12.4%	100.0%

TABLE 7: NUMBER AND PERCENT DISTRIBUTION BY TYPE OF PERSONAL AID

Type of Aid	N	%	% (Adjusted for Non-response)
Monaural	456	45.7	61.4
Binaural	196	19.7	26.4
Y-Cord	91	9.1	12.2
No Response (or not applicable)	254	25.5	—
Total	997	100.0	100.0

COMPARISONS WITH OTHER ESTIMATES

The only other published estimate of the extent of hearing aid use in the special education population was made in an ODS report of the results of the 1969-70 Annual Survey (Rawlings, 1971). In that survey, the information of interest was simply whether or not the student used a personal aid, with "use" defined as one or more hours per day. Of the 23,876 respondents, 67.2% were reported to use a personal aid. At first sight, this figure appears to be substantially lower than the 78% incidence of personal aid use found for the present sample. Does this indicate a notable increase in hearing aid use over the intervening five years? Probably not; in all likelihood the difference reflects a sampling artifact. The earlier Annual Survey sample included, primarily, students from residential schools and from day schools for the deaf. By the spring of 1974, the data base of the Annual Survey had expanded to include more full-time special education classes, integrated programs, and other types of special education situations. As will be shown later in this report, some of these additions constitute precisely the kinds of programs in which an exceptionally high percentage of students wears hearing aids. Therefore, the omission of students from these kinds of programs, as in the 1969-70 data, underrepresented the total extent of hearing aid use in the special education population.

To see how the current estimate compares with the earlier Annual Survey figure, the extent of personal aid use in the 1974 sample was calculated counting only students in residential and day schools for the deaf; 67.8% of these students were found to wear an aid at least some of the time, either in the home/dormitory context or at school. This is very close to the earlier 67.2% estimate and suggests that there has been little if any recent growth in the relative number of students who wear a personal aid. Both estimates relate only to the number of students who wear a personal aid, and it is conceivable that changes have occurred during this

period of time in the amount of use per day of aids or in the extent of use of group aids. It is also possible that there have been changes in the amount of personal aid usage among students in the programs not surveyed in 1969-70.

The apparent stability in the special education population of personal aid use in the period between 1969 and 1974 is particularly interesting in light of estimates reported in the national census of the deaf study (Schein & Delk, 1974). Considering the prevocationally deaf population as a group, the national census researchers found that fewer than three in ten deaf people who were interviewed wore a personal aid. Almost half of the people reported that they had never worn a personal aid.

Comparing these results with the much higher use of hearing aids reported by ODS for the school age population as it was in 1969-70, Schein and Delk predicted an increase in hearing aid use as the present school age population reaches adulthood. The current data add strength to this conclusion, but the stability in the level during the past several years suggests also that the increase eventually will level off.

FACTORS PREDICTING HEARING AID USE

In the following section we examine eight separate variables and consider the relationship each bears to hearing aid use. Before presenting these results, it should be emphasized that although the variables are discussed one at a time as each relates to hearing aid use, none of these individual relationships isolated from the others reveals an entirely adequate picture. Hearing aid use must be seen in the context of the interrelationships among many variables.

The eight variables and the percentage of missing data associated with each of them are given in Table 8. When the variables are analyzed jointly, the percentage of missing information, of course, increases and can be as much as the sum of the variables being considered.

Degree of Hearing Loss

The extent of hearing loss in terms of the better ear average at 500, 1000, and 2000 Hz was obtained for each student in the sample from the figures reported in the 1973-74 Annual Survey. Where this information was not reported, estimates provided by the teacher on the "Special Studies Questionnaire" were used instead.

Table 9 presents the relative distribution of better ear averages for the 997 students in the present sample compared with the 1973-74 Annual Survey figures for the larger population. The low level of missing data on

TABLE 8: PERCENTAGE OF RECORDS WITH DATA UNKNOWN, UNREPORTED, OR UNUSABLE

Item	Percent of 997 Cases
Age	0
Sex	0
Type of Educational Program	0
Ethnic Group	0.9
Better Ear Average	1.9
Family Income	3.5[a]
Hearing Status of Parents	11.2
Cause of Hearing Loss	45.2[b]

[a]Represents non-response rate on this item for families reported in both teacher and family questionnaires.
[b]Includes 30.9% reported as "cause cannot be determined."

the "Special Studies Survey" (1.9%) compared with the Annual Survey figure (5.5%) is due to the inclusion of the teacher estimates of degree of loss in the special studies data. The sample distribution varies from that of the population by having slightly more individuals with profound losses and fewer persons in the less-than-severe categories.

Hearing aid use varies systematically as a function of the better ear average. Figure 1 shows the percentage of students for each category of loss who: a) wear an aid in the classroom *and* at home or in the dormitory; b) wear an aid in the classroom only; and c) do not wear an aid at all. The highest percentage of consistent hearing aid use is found for those students with moderate to severe hearing losses (41dB through 90dB),

TABLE 9: PERCENT DISTRIBUTION OF HEARING LOSS FOR THE SPECIAL STUDIES' SURVEY COMPARED WITH THE 1973-74 ANNUAL SURVEY

	1973-74 Annual Survey (N=43,794)	Special Studies Survey Sample (N=997)
Missing Data	5.5	1.9
Total Known Data	100.0	100.0
Normal and Mild (≤ 40 dB)	5.9	3.5
Moderate (41-55 dB)	7.5	6.4
Moderately Severe (56-70 dB)	13.1	10.9
Severe (71-90 dB)	26.8	27.7
Profound (≥ 91 dB)	46.7	51.4

with only 10.5% of this group reporting no aid use in either situation. The non-wearers are found in greatest proportion among those students with hearing thresholds at either extreme of the distribution. Of the students with profound losses, 22.7% are non-wearers. Included within this group, no doubt, is a large number of individuals with little or no measurable residual hearing who do not benefit from amplification. At the other extreme of the loss categories, those least likely to wear a hearing aid are students with slight impairment (≤40dB); 56.3% of the small number of these students in the sample were non-wearers.

Extent of hearing loss is related not only to whether a student wears an aid, but also to the type of aid worn. Figure 2 shows that the relative proportions of binaural and y-cord use steadily increase with severity of loss. Monaural-aid use correspondingly declines, though it still accounts for a majority of even the students with profound losses.

Age (Year of Birth)

Figure 3 shows the relative distribution of ages for children in this sample and for all 43,794 students participating in the 1973-74 Annual Survey; age was reckoned as of December 31, 1974.

This is a cross-sectional study and, as such, age is confounded with influences imposed by the particular year of birth, and therefore cannot be viewed independently. In particular, the cause of deafness is strongly related to year of birth for this sample. This is most apparent for children born in 1958 and 1964, in which the higher frequencies reflect the rubella epidemics of those years.

Age considered alone has a strong relationship to hearing aid usage, as illustrated in Figure 4. The relative percentage of students who wear aids both in the classroom and at home or in the dormitory declines steadily as a function of age, while the relative number of non-wearers increases.

A different pattern emerges for those who wear an aid only in the classroom. The relative number of students in this category increases to a peak at 10 years of age, and begins to decline abruptly after age 11 years, until virtually no students at age 19 fall into this category. The peak of this "classroom use only" distribution thus corresponds to the height of the rubella epidemic (i.e., 10 year-olds, born in 1964). However, if hearing aid use is charted by age omitting all students whose reported cause of loss was maternal rubella, the same general trends remain. Evidently, the rubella epidemic is unrelated to the "bulge" in the "classroom

FIGURE 1: RELATIONSHIP OF HEARING LOSS TO HEARING AID USAGE

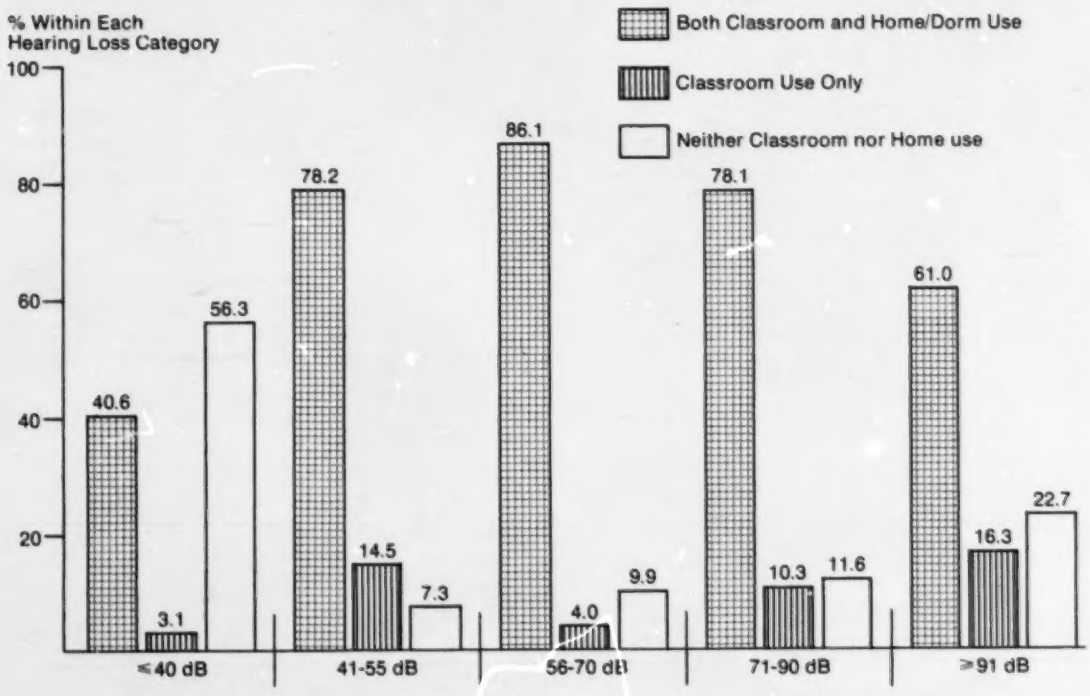


FIGURE 2: HEARING LOSS AND TYPE OF AID WORN

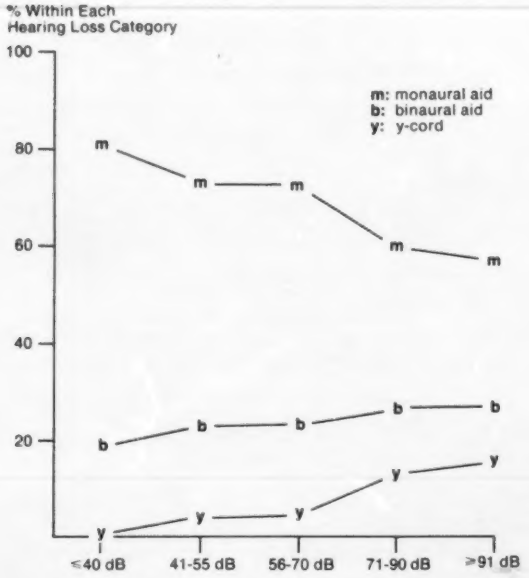


FIGURE 3: RELATIVE DISTRIBUTION OF STUDENTS BY YEAR OF BIRTH: ANNUAL SURVEY (1973-1974) AND SPECIAL STUDIES SURVEY

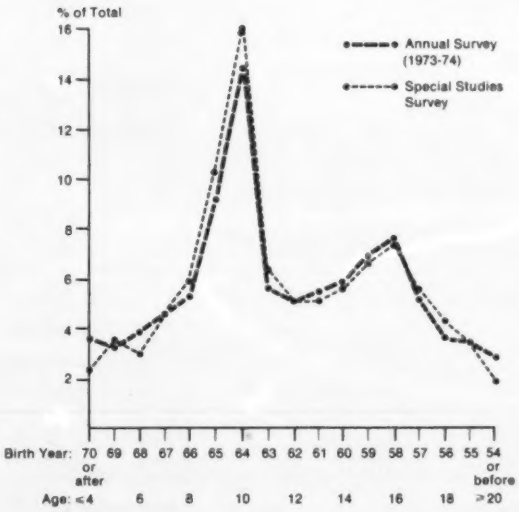
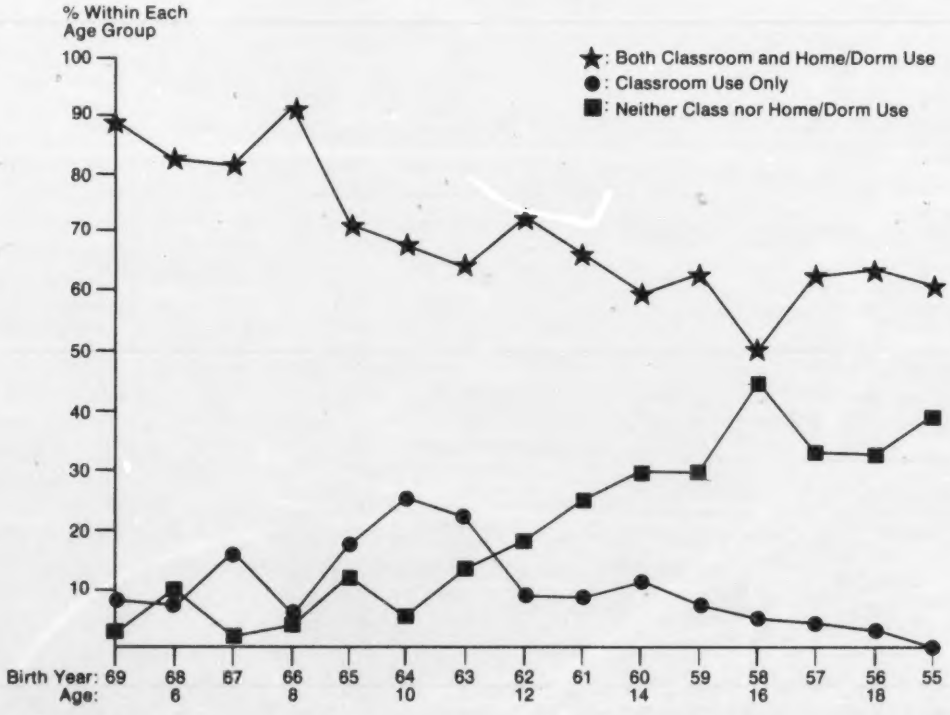


FIGURE 4: DISTRIBUTIONS OF HEARING AID USAGE BY AGE (YEAR OF BIRTH)

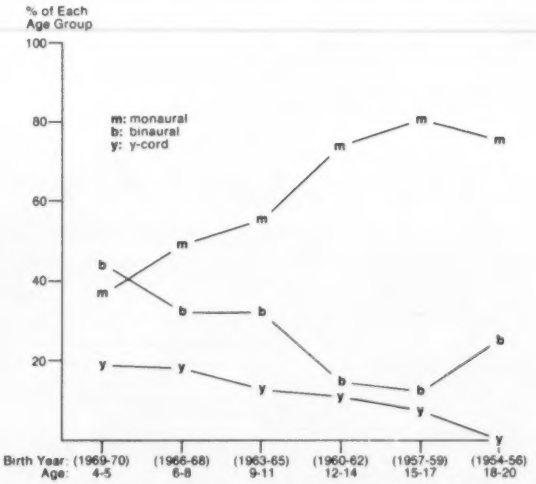


only" category for the 9 to 11 year old groups. It is more likely that the decline after 11 years of age in this category of aid use reflects reduced availability of group amplification in many middle and high school programs, possible de-emphasis on amplification in the classroom with older students, or refusal of older students to wear aids.

The overall decline in hearing aid use by age is undoubtedly due to a combination of factors, such as those just noted. Personal preference and social pressures from age-mates may also contribute to the trend.

The relationship between age and the extent of hearing aid use is independent of the relationship between degree of hearing loss and the extent of hearing aid use. As noted in the previous section, students with profound losses are less likely to wear an aid than are those with moderate to severe hearing losses. If older students are found generally to have more severe hearing losses, it would necessarily contribute to the overall decline in aid usage by age. The data, however, do not confirm this. In fact, the percentage of students with profound losses does not vary systematically with age in this sample ($r = -.11$). Furthermore, when the present distribution of students wearing aids both in the classroom and at home or in the dormitory is plotted separately for students with profound losses and for students with moderate to severe losses, a decline in aid usage with increasing age is noted for each group. The decline is much more gradual for the moderate through severe group than for those with profound losses, which may be attributed partially to a pronounced ceiling effect for the younger students with less than profound losses.

For the students reported to wear a personal aid, the type of aid worn also relates to age. Figure 5 illustrates the systematic changes in types of aids by age: use of monaural aid increases with age, whereas y-cord and binaural aid use declines.



Sex

There are more males (53.2%) than females (46.8%) in this sample. This is very similar to the 1973-74 Annual Survey data (54.1% males, 45.9% females). Sex bears a strong relationship to hearing aid use. In this sample, 75.4% of the females were reported as using a hearing aid both in the classroom and at home/dormitory, while only 63.6% of the males were listed in this category. On the other hand, almost the same relative numbers of males and females were reported to wear an aid in neither situation (20.0% vs. 17.0%). Thus, 16.4% of the males were reported to wear aids only in a classroom situation. This contrasts with the pattern of females, only 7.6% of whom wore aids in the classroom only. Thus, it appears that a basic difference between the sexes is that males are less likely than females to wear an aid outside of the classroom.

The effect of sex on aid use is clarified when the relationship between sex and two other factors is considered. One critical factor is income. For reasons not fully apparent, proportionately more females than males in this sample come from families where income is in excess of $10,000: 58.6% of the females as compared with 49.8% of the males (χ^2, 1 df = 4.9, $p < .05$). Since higher income itself ordinarily is predictive of greater hearing aid use, it is not surprising that the reported extent of hearing aid use also would be greater for the females. In order to examine whether the sex effect for hearing aid use is due merely to income differences, aid use for males and females was compared separately, first for students whose family incomes were less than $10,000, and then for those whose family incomes exceeded $10,000. Table 10 gives this breakdown of the data. When reported family income does not exceed $10,000, sex does not significantly discriminate hearing aid use (χ^2, 1 df = 3.05). However, where the family income was greater than $10,000, females were more likely to wear an aid (χ^2, 1 df = 6.99, p = .03). In summary, sex and economic background appear to operate jointly on hearing aid use in two ways: first, there are proportionately more females than males in the higher income group; and secondly, within that upper income group a large sex difference remains, favoring the females.

A second factor which is a likely contributor to the sex difference is cause of deafness. This will be considered again in the separate section on cause. Briefly

TABLE 10: HEARING AID USE, BY SEX AND LEVEL OF PARENTAL INCOME

Hearing Aid Use	Less Than $10,000 Males	Less Than $10,000 Females	More Than $10,000 Males	More Than $10,000 Females
Class & Home	57.4	59.0	74.5	86.5
Class Only	23.0	15.0	8.1	3.9
Neither Class Nor Home	19.6	26.0	17.4	9.7
Total	100.0	100.0	100.0	100.0

stated, for each specific cause of hearing impairment examined separately, the overall patterns of male-female difference noted above seem to hold. Table 11 gives this information. However, some causes are associated with higher levels of hearing aid use than are others. This affects the sex breakdown in that the group of maternal rubella-caused hearing losses, associated with high aid use, is also a group composed of relatively more females than males (56.6% females). On the other hand, the meningitis group has an overrepresentation of males (73.1% males) and is also found to be associated with a comparatively lower level of hearing aid use in this sample. (See Gentile and Rambin, 1973, for a further account of the relationship of sex and cause.)

Type of Educational Program

For the purposes of this report, students are classified as being in one of four types of special education programs:

1) Residential School for Deaf Students: a school facility in which hearing impaired students are educated, housed, and cared for. The program is intended exclusively for hearing impaired students. The students may be either residential or day, depending on whether they reside on or off campus.
2) Day School for Deaf Students: a facility where all classes are conducted in a building(s) exclusively for hearing impaired students, all of whom live at home and attend school during the day.
3) Full-Time Special Educational Classes: special classes consisting entirely of hearing impaired children. Classes are located in an elementary or secondary school building in which hearing children also attend classes.
4) Integrated Programs, which include:
   a. Part-Time Special Educational Classes: students are partly in special educational classes consisting entirely of hearing impaired students and partly in regularly classes with hearing children.
   b. Itinerant Program: hearing impaired students are enrolled in a regular class with hearing students. In addition, they receive the services of an itinerant teacher of the hearing impaired.
   c. Resource Room: special classroom located in a regular school for hearing children which contains personnel, services, and facilities specifically designed for hearing impaired students. Students participate in regular classroom activities and receive special help in resource room as needed.

The type of special educational program in which the student is enrolled is associated with the extent of hearing aid use. Figure 6 shows this breakdown of the data.

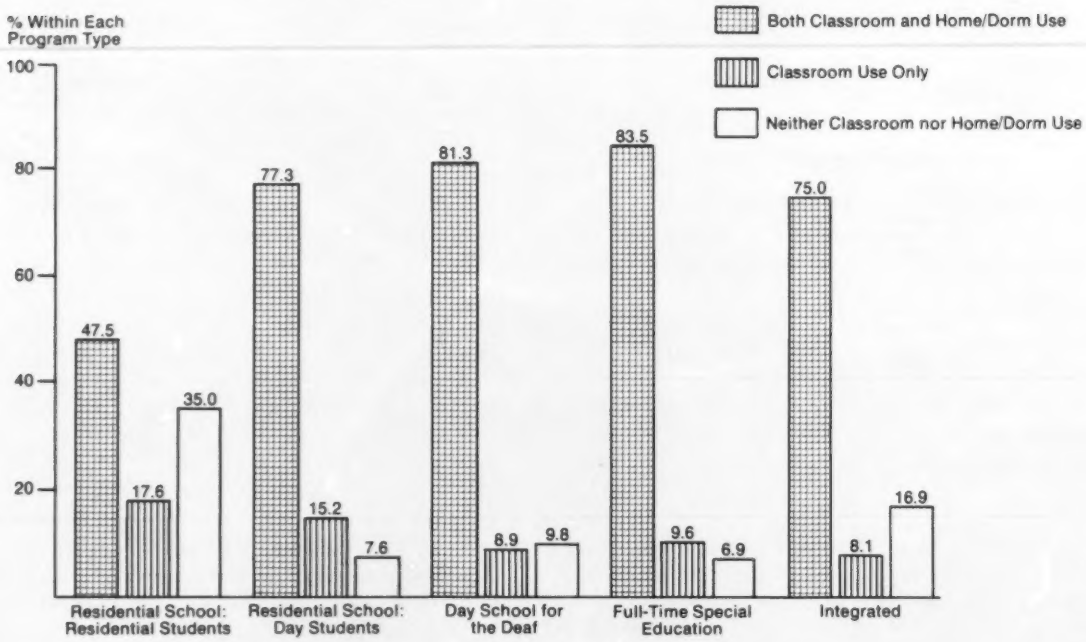
It is apparent that patterns of two of the groups differ markedly from the others, namely: (1) residential students at residential schools; and (2) students in the integrated programs. The residential group is the only one in which fewer than half of the students wear aids both in class and at home. Over one-third of these students wear an aid neither at home nor in the classroom, a proportion far higher than in any of the other types of programs.

The group of students that has the next highest percentage of non-wearers is the group of students in integrated programs.

TABLE 11: HEARING AID USE BY SEX FOR SELECTED CAUSES OF HEARING LOSS

Hearing Aid Use	Maternal Rubella M	Maternal Rubella F	Maternal Rubella Combined	Pregnancy and Birth Complications M	Pregnancy and Birth Complications F	Pregnancy and Birth Complications Combined	Heredity M	Heredity F	Heredity Combined	Meningitis M	Meningitis F	Meningitis Combined
Class & Home	71.4	85.3	79.3	72.6	75.8	73.7	47.5	60.9	52.4	59.1	78.6	63.9
Class Only	17.9	4.6	10.4	8.1	6.1	7.4	27.5	13.0	22.2	15.9	7.1	13.8
Neither Class Nor Home	10.7	10.1	10.4	19.4	18.2	18.9	25.0	26.1	25.4	25.0	14.3	22.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

FIGURE 6: HEARING AID USE WITHIN EACH TYPE OF EDUCATIONAL PROGRAM



As is true of other variables described here, a student's presence in a particular type of program is related to other factors which themselves may be associated with hearing aid use. One such factor is the degree of hearing loss. Different types of programs tend to enroll students with different degrees of hearing loss: individuals with profound losses tend to be enrolled in residential schools, while a much greater percentage of those with mild losses attend integrated classes (Jensema, 1974; Karchmer & Trybus, 1977).

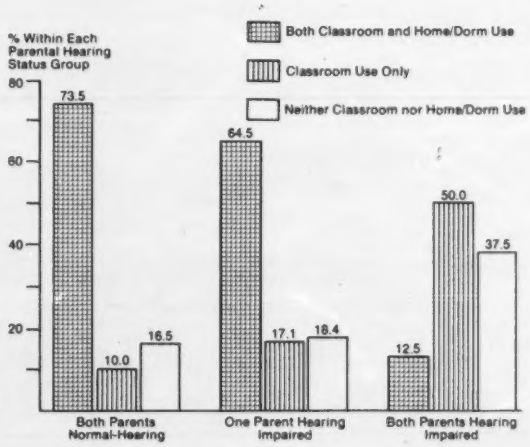
Interestingly enough, while the influences of program type and degree of hearing loss appear to operate jointly, the differences in aid use among the program types cannot be ascribed totally to these differences in hearing level. The reason is that even when aid use and program type are examined for *each* hearing level separately, the residential students at residential schools at each hearing level still show the same trends of increased representation in "classroom only" and non-use categories.

Hearing Status of Parents

For the majority of the students in the sample, both parents were reported to have normal hearing. Of the 797 cases where the hearing status of both parents was reported, 86.8% had parents with normal hearing. Another 10.3% had one normally hearing and one hearing impaired parent. Only 2.9% of the students in the sample reported both parents as hearing impaired.

Figure 7 shows hearing aid use as a function of parental hearing status. If a student has one hearing im-

FIGURE 7: RELATIVE DISTRIBUTIONS OF HEARING AID USAGE BY PARENTAL HEARING STATUS



paired parent, the chances of this student wearing an aid are roughly similar to those of a student both of whose parents hear normally; if the student with one hearing impaired parent does wear an aid, that student is more likely to wear an aid only in the classroom.

The pattern of hearing aid usage for the group of 24 students whose parents both were reported to have hearing impairments is completely different from the other two groups. Nine were reported as using aids neither in the classroom nor in the home/dormitory. Only three of the 24 students with two hearing impaired parents were reported to wear an aid at least some of the time in the classroom and at home or in the dormitory. The other 12 students who were reported to wear aids did so only in the classroom.

Finally, parental hearing status does *not* significantly discriminate the type of personal aid used by those students reporting use of a personal aid.

Family Income and Ethnic Background

Family income level has a marked influence on whether a student wears an aid. This has been discussed previously (Gentile, 1967) and is understandable in light of the fact that hearing aids are costly to buy and to maintain. Figure 8 shows the relative percentage of students who fall into each category of hearing aid use for each of five family income levels. The trends are quite clear: as income level increases, the relative percentages of students who do not wear aids or who wear aids only in a classroom situation decline systematically. At the same time, the percentage of students wearing an aid in both the classroom and at home increases with reported income up to the $15,000-$20,000 category.

Of course, family income itself is a factor that is interrelated with virtually every other previously described variable (Rawlings & Jensema, 1977). Its relation to the sex of the student has been described in an earlier section. Another important relationship is that of income and ethnic group. The effect of this relationship on hearing aid use is particularly illustrative of why neither variable can be viewed in isolation.

The ethnic composition of the sample is shown in Table 12 as compared to the results of the 1973-74 Annual Survey. The relative frequencies of the white and black groups closely correspond for the two sources. Spanish-Americans are represented in the present sample at roughly twice their relative level in the Annual Survey, with a corresponding decrease of the "other" ethnic groups (e.g., Oriental, American Indian).

FIGURE 8: RELATIVE DISTRIBUTIONS OF HEARING AID USE BY LEVEL OF FAMILY INCOME

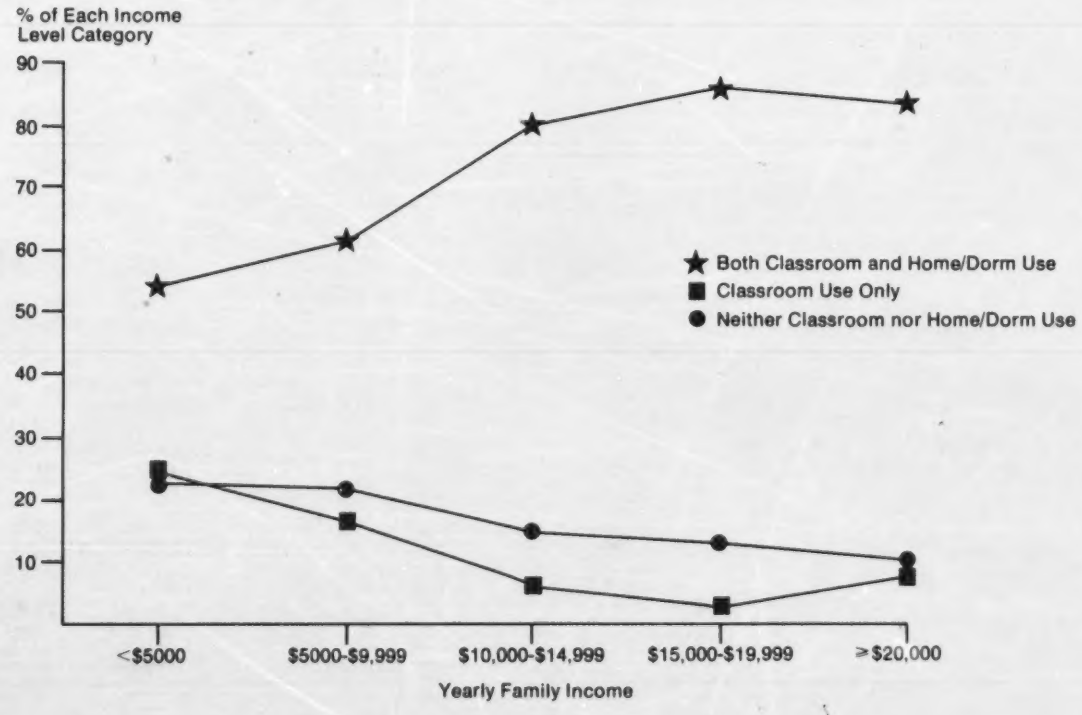


TABLE 12: PERCENT DISTRIBUTION OF ETHNIC GROUPS: 1973-74 ANNUAL SURVEY AND SPECIAL STUDIES SAMPLE[a]

Ethnic Group	1973-74 Annual Survey	Special Studies Survey Sample
White	71.0	68.3
Black	15.0	17.4
Spanish-American	6.8	13.4
Other	7.2	0.9
Total	100.0	100.0

[a]Adjusted for missing data.

There are clear differences in family income according to ethnic group. Only 32.7% of the white students come from families with incomes less than $10,000. In contrast, 81.5% of the black students and 72.9% of the students of Spanish origin come from such families. For blacks, this fact is apparently related to an overall lower use of hearing aids, as shown in Figure 9. However, the same cannot be demonstrated for the Spanish-American group. Even though their family income levels are roughly similar to those of the black students in the sample, their pattern of hearing aid use approximates that of the whites. Within each ethnic group, the same general patterns hold: students with family incomes greater than $10,000 are more likely to wear an aid both in class and at home and are less likely to be in either of the other categories (see Table 13).

Type of Aid and Parental Income

Not only does the variable of family income level differentiate hearing aid wearers from non-wearers, but it is also related to the type of personal aid worn. Figure 10 shows the type of aid reported (monaural, binaural, y-cord) by family income level. The hearing aids worn by students whose families are in the lower income category are more likely to be monaural and less likely to be either of the other types.

Cause

Figure 11 shows the distribution of reported causes of hearing impairment for the students in this sample. Where two or more causes were reported, the first reported cause was counted. (This, however, applies to only 5% of the total number of cases.)

FIGURE 9: HEARING AID USE FOR EACH ETHNIC GROUP

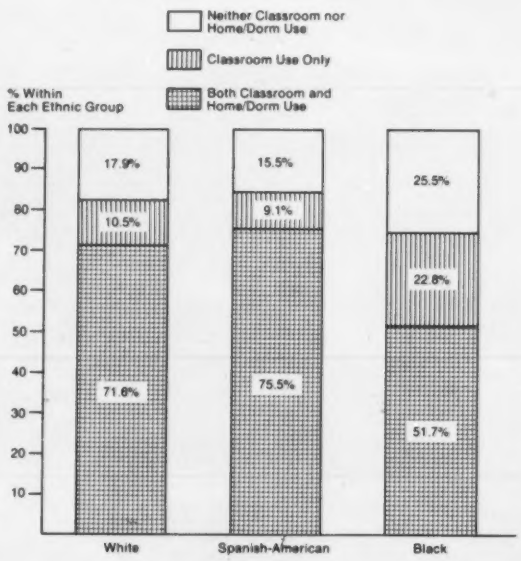
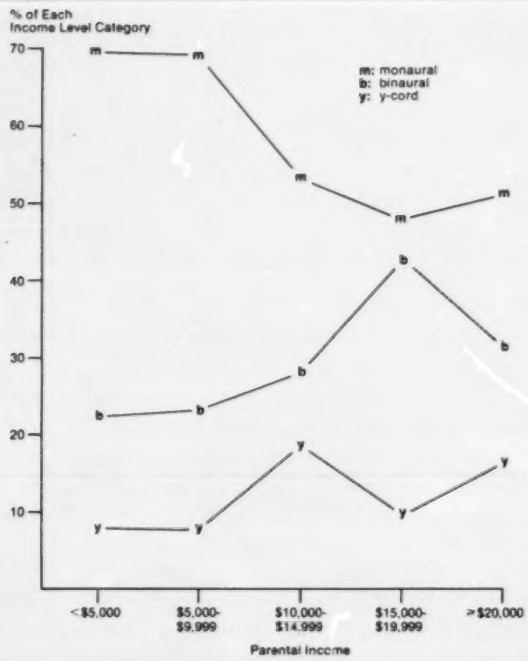


TABLE 13: RELATIVE PERCENT DISTRIBUTION OF HEARING AID USE FOR EACH ETHNIC GROUP AND LEVEL OF FAMILY INCOME[a]

Hearing Aid Use	White		Black		Spanish-American	
	<$10,000	>$10,000	<$10,000	>$10,000	<$10,000	>$10,000
Class & Home	58.7 (74)	79.5 (206)	43.9 (29)	80.0 (12)	69.8 (30)	87.5 (14)
Classroom Only	19.1 (24)	6.2 (16)	25.8 (17)	13.3 (2)	13.9 (6)	0.0 (0)
Neither Class Nor Home	22.2 (28)	14.3 (37)	30.3 (20)	6.7 (1)	16.3 (7)	12.5 (2)
Total	100.0 (126)	100.0 (259)	100.0 (66)	100.0 (15)	100.0 (43)	100.0 (16)

[a]Numbers of students are given in parentheses.

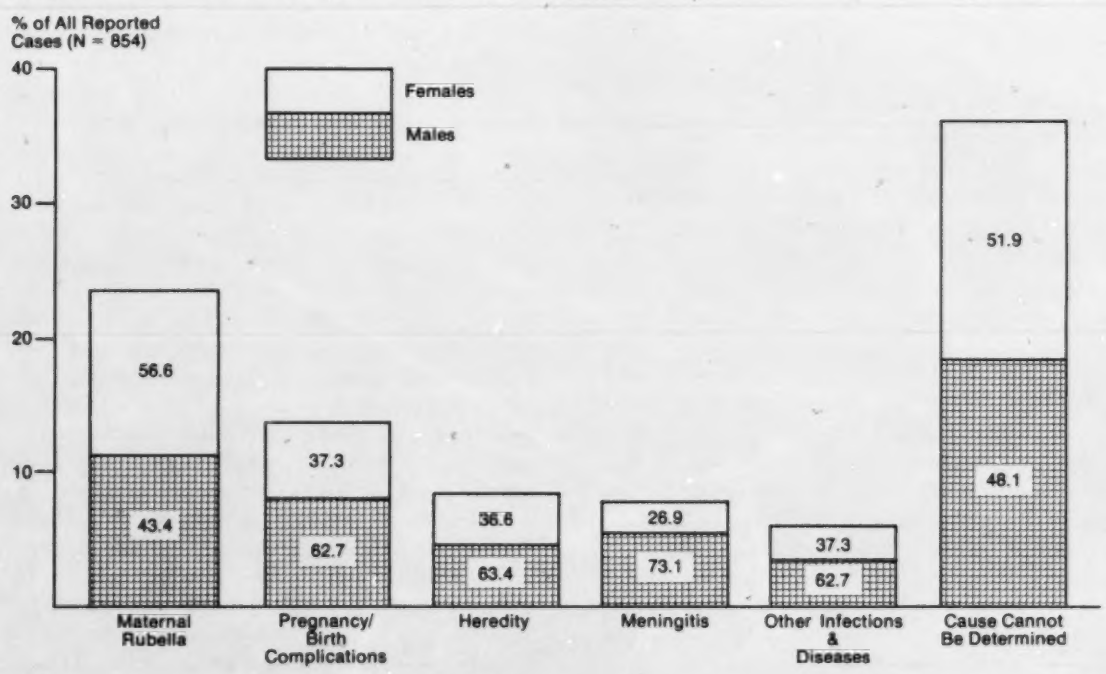
FIGURE 10: PERCENT USING EACH KIND OF AID, BY LEVEL OF PARENTAL INCOME CATEGORY



The relationship between hearing aid use and reported cause is difficult to assess. For a large proportion of the total cases (35.7%), this information was not reported because a specific cause either could not be determined or was not listed in the student's file at the school. It has been estimated that a large percentage of cases of undetermined cause is in fact due to heredity (Ries & Voneiff, 1974). This means that hereditary deafness represents a larger fraction of the total than the 8.2% accounted for in the sample. For the 61 students whose hearing impairment was reported as caused by heredity, nearly one-half had one or both deaf parents. As illustrated in the analysis of parental hearing status, the presence of deafness in the immediate family is itself related to hearing aid use.

Cause itself is related to a number of factors, factors which in turn are highly associated with hearing aid use independent of cause. A prime example of this is the relationship of cause to sex. As previously discussed, the overall pattern of aid use for females is different from that of males. Females are more likely to be reported as wearing aids outside of the classroom than males. Since the proportion of males and females differs considerably for the various specific reported causes of deafness, as shown in Figure 11, sex therefore has an indirect influence on the relationship of cause and hearing aid use.

FIGURE 11: DISTRIBUTION FOR SELECTED CAUSES, BY SEX



Another illustration of this point concerns maternal rubella, which is the only specific causal group with more females than males. The increased aid use for this group may simply reflect the overrepresentation of females in the rubella group. Conversely, the lower reported frequency of aid use for the meningitis category may be partially attributable to its higher incidence in males in the sample. In addition, meningitis has been associated with greater decibel losses, 85 dB or higher, compared to other causes of deafness (Gentile & Rambin, 1973). This is particularly true for the present sample, where 65% of those with meningitis-caused losses are reported as having profound losses. As previously noted, a high percentage of those not wearing aids occurs among students with profound losses.

Another factor which may influence analysis of cause and its relationship to hearing aid use is age (year of birth). Fifty-seven percent of all those who reported maternal rubella as the cause of hearing loss were born in 1964 and 1965, and thus were 9-10 years old at the time of the survey. Increased aid use is noted for both rubella and non-rubella elementary school children around these ages. There is, of course, a possibility that the influx of students with rubella-caused hearing losses had such a widespread influence on hearing aid policy in the schools that it affected all students born at those times. However, it seems more probable that age may be a more important determinant of the frequency of aid use than the cause of loss.

It must be supposed that various causes give rise to different hearing loss patterns that determine when the loss is noted, whether or not the loss is progressive, and the physical nature of the loss—and these together affect the efficacy of fitting a particular child with a hearing aid at a given time. In summary, cause of loss as a factor in the frequency of hearing aid use is not inoperative; but, as is clear from the foregoing discussion, its influence on hearing aid use should not be considered apart from other variables.

Onset of Deafness

Age at onset of deafness, a variable inseparable from cause, does not directly predict for the present sample whether or in what situation a student will wear a hearing aid. However, reported age at onset is related to the type of aid the student is reported to wear. Table 14 gives this information. Students whose reported onset is at birth are more likely to wear a y-cord aid and relatively less likely to wear a monaural aid as compared to students with later onsets.

TABLE 14: TYPE OF PERSONAL AID USED BY AGE AT ONSET OF DEAFNESS[a]

Type of Aid	At Birth	Before 3 Years	After 3 Years
Monaural	283 (56.9)	88 (72.1)	21 (70.0)
Binaural	142 (28.6)	27 (22.1)	8 (26.7)
Y-Cord	72 (14.5)	7 (5.8)	1 (3.3)
Totals	497 (100.0)	122 (100.0)	30 (100.0)

[a]Numbers in parentheses represent percent response.

MULTIPLE REGRESSION ANALYSES OF AMOUNT OF HEARING AID USE

In this section, multiple regression techniques are used to examine the relationship between hearing aid usage and seven of the variables discussed in the previous sections. The basic question is to what extent do these seven variables taken as a group predict the amount of hearing aid use by students in the sample in two separate situations: (a) in the classroom; and (b) at home or in the dormitory.

Two separate stepwise multiple regressions were performed in which, first, the amount of hearing aid use in the classroom and, second, the extent of personal hearing aid use at home or in the dormitory were regressed on seven independent variables. The amount of classroom use was calculated as the proportion of time the student wore an aid of any kind in class to the total time spent in class.

The extent of personal hearing aid use at home or in the dormitory was taken from questionnaire responses, coded as follows: *0* for "never," *1* for "sometimes," *2* for "usually," and *3* for "always." Note that an equal interval scale of measurement is presumed for this analysis.

Seven independent variables were entered into the regression equations. Three of these—year of birth, number of hearing impaired parents, and family income—are metric variables and hence entered directly into the regression equations. Three other independent variables (sex, ethnic group, and type of educational program) are categorical and as such could not be entered into the analyses directly. They were therefore recoded as binary variables, with the codings based on the bivariate relationships as discussed previously. Program type was therefore coded according to *residential school status* (residential school students in residential schools or students in all other educational settings); *ethnic status* was recoded according to whether the student was black or non-black. *Sex* was

entered as female or male. Finally, because better ear average does not appear to bear a linear relationship to hearing aid use, this variable was recoded in a binary scheme in which students with moderate through severe hearing losses (41-90 dB) were contrasted with students of all other degrees of loss.

The tables below show summaries of the stepwise multiple regression analyses for amount of hearing aid use in the classroom (Table 15) and for extent of personal aid use at home or in the dormitory (Table 16).

In stepwise analysis, the variable that explains the greatest amount of the variance in the dependent variable (amount of hearing aid use) is entered first; in succeeding steps, the variable that explains the greatest amount of variance unexplained by the variable(s) already in the equation enters next. This continues until all variables are entered. In Tables 15 and 16, the order in which the variables are listed in the left column reflects the order in which they were entered into the equations according to the above criteria.

The multiple correlations (Multiple R) shown in the second column of each table express the joint relationship between an independent variable and those listed above it with the dependent variable. The coefficient of determination (Multiple R^2) shown in the next column shows the proportion of the total variance of the dependent variable explained by the linear dependence of an independent variable and those listed above it. The simple correlation (r) in the fourth column is the extent of relationship between an independent and the

TABLE 15: AMOUNT OF HEARING AID USE IN THE CLASSROOM: SUMMARY OF MULTIPLE REGRESSION ANALYSIS

	Multiple R	Multiple R^2	Simple r	Beta
Residential School Status* (residential students at residential schools vs all others)	.35	.12	−.35	−.22
Year of Birth*	.43	.18	.35	.28
Degree of Hearing Loss* (41-90 dB vs all other degrees of loss)	.46	.21	.22	.17
Number of Hearing Impaired Parents*	.47	.22	−.10	−.10
Family Income	.48	.23	.14	.07
Sex (female vs male)	.48	.23	.05	−.04
Ethnic Status (black vs non-black)	.48	.23	.07	−.02

*Significant ($p < .05$) contribution to regression equation.

TABLE 16: EXTENT OF PERSONAL HEARING AID USE AT HOME OR IN THE DORMITORY: SUMMARY OF MULTIPLE REGRESSION ANALYSIS

	Multiple R	Multiple R^2	Simple r	Beta
Residential School Status* (residential students at residential schools vs all others)	.32	.11	−.32	−.24
Family Income*	.40	.16	.27	.14
Degree of Hearing Loss* (41-90 dB vs all other degrees of loss)	.44	.20	.26	.20
Ethnic Status* (black vs non-black)	.47	.22	−.23	−.15
Number of Hearing Impaired Parents*	.49	.24	−.18	−.14
Sex (female vs male)*	.50	.25	.14	.12
Year of Birth	.50	.25	.13	.06

*Significant ($p < .05$) contribution to regression equation.

dependent variable (confounded by influence of the other independent variables). Finally, the rightmost column in each table is the standardized partial regression coefficient or *beta*, which is used as a measure of the linear relationship between each independent variable and the dependent variable, with adjustments made for all other independent variables.

The multiple correlations between the amount of classroom use and the seven variables as described above is .48; the multiple correlation between the extent of personal aid use in home or in the dormitory and the seven variables is .50. This means that 23 and 25 percent of the variation in the two dependent variables respectively can be explained by the seven independent variables operating jointly. While this level of prediction is fairly modest, it must be remembered that the analyses are to a degree restricted by the distributions of the dependent variables themselves. Because there is such a high overall level of hearing aid usage among students in the sample, there is only a limited amount of variance left to explain.

As shown in Table 15, the best single predictor of the amount of hearing aid usage in the classroom is a student's residential school status: not living at a residential school is associated with greater amounts of hearing aid usage. Year of birth accounts for almost as much variance as residential school status (i.e., the simple correlations are nearly equivalent). However, it is important to note that when the influence on hearing aid usage in the classroom due to each of the other six variables is statistically controlled, year of birth is shown to have the highest partial correlation with the amount of hearing aid use in classroom (*beta* = .28). Younger students have higher levels of aid use. Finally, having a moderate or severe hearing loss and having no hearing impaired parents both enter the equation as significant predictors of increased hearing aid use in the classroom.

Family income, students' sex, and students' ethnic status do not significantly improve the prediction after the other four variables have been entered.

Table 16 shows the nature of the joint relationship of the seven variables with the extent of personal hearing aid use in the home or in the dormitory. The results of this analysis reveal both similarities and contrasts with that of hearing aid use in the classroom. The main similarity is that students' residential school status is again the best single predictor of the amount of hearing aid usage in the home or in the dormitory. Even when the influence due to the other six variables is controlled, students' residential school status is the highest correlate of the extent of hearing aid use in the home or in the dormitory. Also, as with hearing aid use in the classroom, having a moderate or severe loss and having no hearing impaired parents are significant indicators of increased aid use.

Year of birth is the only variable which, in conjunction with the other six, does not significantly enter into the regression equation for the extent of hearing aid use at home or in the dormitory. This of course presents a marked contrast with the analysis of aid use in the classroom. There are other interesting differences between the two analyses that illustrate that the relative amounts of hearing aid use in the two situations are under the control of slightly different sets of factors. For aid use at home or in the dormitory, characteristics such as family income, sex, and ethnic status all are significant. None of these three entered significantly into the regression equation predicting amount of aid use in the classroom.

SUMMARY

Wearing a hearing aid is a fact of life for the majority of hearing impaired children in the United States. Of this national sample of 997 special education students surveyed in the spring of 1974, 78% were reported to wear a personal hearing aid at least some of the time. When students who were reported to receive only group amplification are added to the total, the figure rises to over 81%. This level of hearing aid use for students is more than double that of the deaf population as a whole, as reported for the national census of the deaf population.

Whether and in what situations students use hearing aids are related to several variables: degree of hearing loss, age, type of educational program, sex, ethnic group, family income, parental hearing status, and cause of hearing loss. These variables in turn are highly intercorrelated, i.e., simple relationships are not enough to provide an adequate explanation. Hearing aid use is related to the degree of students' hearing loss, with the highest probability of use being for students with moderate to severe losses and the greatest likelihood of non-use being for students with profound or very mild losses. Age bears a direct relationship to hearing aid use; the percentage of hearing aid users declines steadily with increasing age. As family income level decreases, so too do the relative numbers of students who wear hearing aids both in the classroom and at home. Reported income may affect other relationships as well. For example, males as a group are less likely to wear an aid outside the classroom. Because the families of female students in this particular sample were reported to have a higher average income than the families of the males, the sex affect may be related to these income differences.

The effects on hearing aid use of sex and cause of hearing loss are also difficult to separate: the ratio of males to females for several reported causes of deafness appears to parallel changes in level of hearing aid use. Thus, for example, the group of students with losses caused by maternal rubella, which is composed of relatively more females than males, has a high level of hearing aid use. The group with meningitis-caused losses, on the other hand, has 73% males and reports a much lower level of hearing aid use.

Students in residential school programs for the deaf are less likely to use hearing aids, a fact due partly to the relatively high percentage of profoundly deaf students enrolled in these programs. Ethnic group status and hearing aid use are related; black students are more likely than either white or Spanish-American students to be non-wearers.

Finally, in order to portray the relative importance of the variables discussed, multiple regression analyses were done for the amount of hearing aid use in the classroom and for the extent of personal aid use at home or in the dormitory. When all the variables are considered at once, those most predictive of hearing aid use in the classroom are whether the student lived at a residential school, the student's age, and the degree of hearing loss. Personal characteristics such as income, sex, and ethnic group were comparatively less important. On the other hand, for the extent of personal aid use at home or in the dormitory, all of the variables except year of birth entered significantly into the regression equation.

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Appendices

Appendix 1: Office of Demographic Studies, Gallaudet College

Appendix 2: Basic Data Form, Annual Survey of Hearing Impaired Children and Youth, 1973-74 School Year

Appendix 3: Special Studies Questionnaire for Teacher

Appendix 4: Family Questionnaire

Appendix 5: Schools Participating in the 1974 National Achievement Test Standardization Program

APPENDIX 1

Office of Demographic Studies Gallaudet College

BACKGROUND AND PURPOSE

The purpose of the Office of Demographic Studies and its Annual Survey of Hearing Impaired Children and Youth is to provide, on a national scale, information and data-oriented services which can assist in improving and expanding the educational opportunities available to hearing impaired persons. In order to develop this information and provide these services, it attempts to collect data on the entire hearing impaired population through college age in the United States. This population includes those who are receiving special educational services related to their hearing impairment, those who have been diagnosed as hearing impaired but who are not receiving such special educational services, and those who are in fact hearing impaired but whose hearing loss has not yet been diagnosed. The work of the Office has concentrated, to date, on the individuals in the first group, those who are receiving special educational services related to their hearing impairment.

The Annual Survey was begun in response to the concern of educators, audiologists, legislators, psychologists, and others working in the field of hearing impairment, indicating the need for national data of this type. The Survey began national operations in May, 1968, following two years of pilot and developmental work in a five state area to determine the operational feasibility of a program of this nature. The initial funding was supplied by the Bureau of Education for the Handicapped, U.S. Department of Health, Education, and Welfare. Continued financial support from 1972-1974 was provided by the National Institute of Education and by Gallaudet College. Present funding is provided by Gallaudet College, whose programs and services receive substantial support from the Department of Health, Education, and Welfare.

POLICIES

The Office actively encourages the use of its information and services and the original data on which they are based by administrators, researchers, teachers, and other professionals who are providing services to hearing impaired people, as well as by other individuals and groups devoted to improving the results of special education for hearing impaired persons.

In its work of developing and disseminating useful information, the Office has the benefit of the guidance and advice of its National Advisory Committee. Among its members are hearing and deaf individuals, administrators, researchers, educators, and specialists from other areas within the field of hearing impairment. Every attempt is made to maintain a wide diversity of interests and competencies, as well as geographic representation, among its members. On questions of a technical nature, consultants from specialized fields are utilized as particular needs arise.

While the Office is intended to be permanent and national in scope, it does not aim to replace or absorb the work of other programs at the state or local level which are devoted to the collection and dissemination of information on hearing impaired children and youth. Rather, it seeks to facilitate their work through cooperation whenever this is possible. Nor does the Office view itself as the center for all types of research in this field. It focuses its activities on collecting and disseminating national baseline data on selected topics of general concern to those interested in the education of hearing impaired children and youth. It seeks to make available to researchers, administrators, and other professionals the vast amount of information it possesses and any special services it can render to them.

One restriction which is observed by the Office is that no data will be released which permits the identification of an individual student or cooperating program. Exception to this occurs only when a written release is obtained from the program supplying the information. Otherwise, independent researchers using the data of the Annual Survey have access only to summary statistics or coded information.

Since the Office of Demographic Studies attempts to promote the use of its data by those whose judgments

and decisions will have a direct or indirect bearing on the education of hearing impaired individuals, it recognizes a responsibility to devote a part of its resources to the evaluation and improvement of the quality of the information collected and disseminated. This is particularly important because it seeks to establish national norms on the basic characteristics of hearing impaired children and youth. Thus, in its dissemination of information, the Office makes every effort to properly qualify its data and indicate any limitations associated with it.

The Office of Demographic Studies seeks to avoid associating itself with an established position relating to controversial issues within the field of educating hearing impaired individuals. Thus, it does not draw policy conclusions from its data. Rather, it seeks to facilitate the use of its data by reputable individuals or organizations that may themselves wish to draw policy implications or test research hypotheses that are related to these issues.

DATA COLLECTION

During the first year of the Annual Survey, the 1968-69 school year, data collection activities were directed towards all schools for the deaf and a representative sample (15%) of all special classes. In addition, records on students who were receiving itinerant services were obtained in total from two states and in part from several states. In all, 25,363 individual records were collected during the 1968-69 school year.

Since then, the Survey has greatly increased its coverage of the population, both in regard to numbers and in its inclusion of hearing impaired students who are fully integrated into regular schools for hearing students and receive either no or only minimal, occasional services for their hearing impairment. During the 1976-77 school year, data on almost 54,000 students were collected by the Annual Survey, a number which included over 80% of the students in special educational programs throughout the country.

PROGRAM SERVICES AND PUBLICATION OF THE DATA

The Office is accumulating a large volume of statistical data. The processing and dissemination of this information hold wide implications and potential benefits for educational, audiological, medical, psychological, legislative, and other services to the hearing impaired. Towards the goal of fully utilizing the data, the program makes it available to independent investigators for research purposes, including masters' theses, doctoral dissertations, institutional level research programs, private studies, etc. Competent researchers are encouraged to propose detailed analyses of the information to further increase its usefulness. In addition to the direct use of the accumulated data, a second significant value of this large volume of data is the potential it provides for selecting well-described samples on a national basis for special studies of relevant variables.

The Test Department of the Office has completed three National Academic Achievement Testing Programs, in 1969, 1971, and 1974. One result of the 1974 achievement testing program has been the production of national norms for hearing impaired students based on a special version of the 1973 edition of the Stanford Achievement Test revised for these students. The Test Department of the Office is able to supply the revised test materials to educational programs interested in using them to assess their hearing impaired students. Work is also underway on analysis of the vast amount of data generated by the achievement testing projects and by other collections of test information, such as the 22,000 nonverbal IQ test scores gathered in recent years.

The Office also provides each participating educational program with tabulations of the characteristics of its own students, as compared with national distributions and with other significant distributions such as those for the state or region in which the program is located. Programs wishing to obtain punch cards or magnetic tape compilations of data for their programs for further analysis are provided with these materials. Standard Record Forms are available from the Office, as are the consulting services of the Office staff for programs wishing to develop or improve their data collection and record-keeping systems in the areas of student characteristics and educational performance.

The unique value of the project lies in its national perspective and in the nationwide network of contacts and working relationships which it has developed during the years of its existence and which underlies all its activities. It is the maintenance of this network and the accumulated experience in its use which allows the Office of Demographic Studies to provide the national baseline data needed by the field of education of hearing impaired children on a continuing basis.

The Office reports much of its data in its own publications series. A listing of the publications issued to date appears on pages 29 and 30 of this report. Reporting also takes the form of articles submitted for publication in professional journals, reports made at professional meetings and conventions, and lectures or seminars at University training programs and other gatherings or associations to which staff members of the Office have been requested to make presentations.

FUTURE PLANS

During its years of operation since 1968, the Office has devoted most of its resources to gathering basic demographic information on hearing impaired students and to the development and standardization of achievement testing procedures for these students. Much attention has been paid to extending the breadth and quality of the data collection, analysis, and reporting.

As the description of the population of hearing impaired students has improved, it has become possible to begin a series of special studies on well-selected samples of these students. Sample studies are currently underway in which families of hearing impaired students and their classroom teachers are providing further information of relevance to the educational process. The scoring results from the National Achievement Test Standardization Program of 1974 are being analyzed, and national norms for hearing impaired students are now available. A survey of the educational programs themselves focusing on the instructional staff, supporting staff, facilities, and services of these programs has been completed, and results of this survey will be published in the near future.

Projects currently under consideration include studies of hearing impaired students in mainstream educational settings and of the vocational training and career education opportunities for hearing impaired students, possibly including some measures of student performance in these areas. Increasing national attention is also being given to the question of achievement or learning in the preschool programs for hearing impaired children; this may also be an area of future activity for the Office.

The success of the Office will ultimately be measured not only by the volume of data collected and reports published, but by the significance of the services it is able to render to those persons who work with hearing impaired children and youth.

APPENDIX 2

OFFICE OF DEMOGRAPHIC STUDIES
Gallaudet College, Washington, D.C.

BASIC DATA FORM

ASHICY 2 (74)

ANNUAL SURVEY OF HEARING IMPAIRED CHILDREN AND YOUTH—1973-74 School Year

CONFIDENTIAL: All information which would permit identification of any individual or institution will be held strictly confidential and will be used only by persons engaged in the survey for preparing statistical summaries. The data will not be disclosed to others for any other purpose.

I. IDENTIFYING INFORMATION

A. 1. Name of Student or Code Number _____ (Last) _____ (First) _____ (Middle) 2. Date of Birth _____ (Mo., Day, Yr.) 3. Sex ☐ M ☐ F

4. Residence _____ (City) _____ (County) _____ (State)

B. Present School or Agency _____ (Name) _____ (Street) _____ (City)

II. SPECIAL EDUCATIONAL PROGRAM

A. IS THIS STUDENT IN A SPECIAL UNIT FOR MULTIPLY HANDICAPPED STUDENTS? ☐ Yes ☐ No

B. Indicate the type of special educational program in which this student is enrolled related to his hearing loss by checking alternatives 1., 2., 3. or 4 below. Then complete the section in the category you have checked where applicable.

1. ☐ RESIDENTIAL PROGRAM
   a. ☐ School for Deaf Students ☐ School for Multiply Handicapped Students
   b. Is the student: ☐ Residential ☐ Day

2. ☐ DAY SCHOOL (No Hearing Students in the Building)

3. ☐ DAY CLASSES & SERVICES FOR DEAF OR HARD OF HEARING STUDENTS
   - ☐ Full-time Special Educational Classes _____ : _____ Hrs./Week
   - ☐ Part-time Special Educational Classes _____ : _____ Hrs./Week
   - ☐ Itinerant Program _____ : _____ Hrs./Week
   - ☐ Resource Room _____ : _____ Hrs./Week
   - ☐ Other (specify) _____ : _____ Hrs./Week

4. ☐ SPEECH & HEARING CLINICAL SERVICES
   Type (specify) _____ : _____ Hrs./Week

III. HEARING LOSS

A. AUDIOLOGICAL FINDINGS

1. Air Conduction Test (If Air Conduction Results Are Not Available, Go to III. A. 2.)
   a. Standard Used: ☐ ISO ☐ ASA b. Date Tested: _____
   Note: If Sound Field Examination, Check Here: ☐

	RIGHT EAR								LEFT EAR							
Frequency	125	250	500	1000	2000	4000	6000	8000	125	250	500	1000	2000	4000	6000	8000
Hearing Level																

If results are not reported at 500, 1000, and 2000 Hz for both ears, complete III. A. 2.

2. Check the box beside the statement which best describes the student's hearing loss.
   ☐ Normal Limits (Less than 27 dB ISO) ☐ Mild (27-40 dB ISO) ☐ Moderate (41-55 dB ISO) ☐ Moderately Severe (56-70 dB ISO) ☐ Severe (71-90 dB ISO) ☐ Profound (91 dB plus ISO)

B. AGE AT ONSET OF HEARING LOSS
   ☐ At Birth _____ Years of Age ☐ Unknown

C. CAUSE OF HEARING LOSS
   ☐ Cause Cannot Be Determined ☐ Data Not Available in Student's Record

1. If onset at birth, what was the probable cause? (Check all that apply.)
   ☐ Maternal Rubella ☐ Other Complications of Pregnancy ☐ Prematurity ☐ Rh Incompatibility
   ☐ Trauma at Birth ☐ Heredity ☐ Other (specify) _____

2. If onset after birth, what was the probable cause? (Check all that apply.)
   ☐ Meningitis ☐ Mumps ☐ Measles ☐ Otitis Media ☐ Trauma
   ☐ High Fever ☐ Infections ☐ Other (specify) _____

IV. ADDITIONAL HANDICAPPING CONDITIONS

Check all educationally significant handicapping conditions: If none, check here ☐

☐ Epilepsy	☐ Visual Problem	☐ Perceptual-Motor Disorder
☐ Brain Damage	☐ Mental Retardation	☐ Heart Disorder
☐ Orthopedic	☐ Cerebral Palsy	☐ Emotional-Behavioral Problem

☐ Other (specify) _____

V. ETHNIC BACKGROUND

☐ White	☐ Spanish-American	☐ Oriental	☐ Unknown	☐ Cannot Report
☐ Negro or Black	☐ American Indian	☐ Other (specify)_____		

COMMENTS:

APPENDIX 3

OFFICE OF DEMOGRAPHIC STUDIES
Gallaudet College, Washington, D.C.

ASHICY 4 (74)

SPECIAL STUDIES QUESTIONNAIRE
ANNUAL SURVEY OF HEARING IMPAIRED CHILDREN AND YOUTH

CONFIDENTIAL: All information which would permit identification of any individual or institution will be held strictly confidential and will be used only by persons engaged in the survey for preparing statistical summaries. The data will not be disclosed to others for any other purpose.

HEARING AID USAGE

*I. HEARING AID USAGE IN THE CLASSROOM

Does the student use a hearing aid (personal/group) in the classroom?

☐ Yes (Complete A & B) ☐ No (Go to II.)

A. Of the _____ hours per day the student is in the classroom, he/she uses a hearing aid (group/personal) for _____ hours.

B. What type of aid does the student usually use in the classroom?

☐ Personal: ☐ Student owns the aid; ☐ Personal aid supplied by the School

☐ Group: Please specify type of group aid; ☐ Headset ☐ Wireless Set

*II. HEARING AID USAGE OUTSIDE THE CLASSROOM

A. Outside the classroom, but while at school, how often does the student use a personal hearing aid (excluding inappropriate times such as football, swimming, etc.).

☐ Never ☐ Sometimes ☐ Usually ☐ Always

B. At home or in the dormitory, to your knowledge, how often does the student use a personal hearing aid (excluding inappropriate times such as sleeping, etc.)?

☐ Never ☐ Sometimes ☐ Usually ☐ Always

FOR CURRENT USER OF AN AID, COMPLETE III. FOR CURRENT NON-USER OF AN AID, COMPLETE IV.

*III. CURRENT USERS OF PERSONAL AIDS

A. Is the personal aid: ☐ Monaural ☐ Binaural ☐ Y-Cord

B. Has the student had the hearing aid he is now using for more than one year?

☐ Yes ☐ No ☐ Do Not Know

C. Has the performance of that hearing aid been evaluated by an audiologist during the past year?

☐ Yes ☐ No ☐ Do Not Know

D. Does your program have a "trouble shooting" procedure to check the student's aid for broken cords, dead batteries, etc.?

☐ Yes (Complete 1. and 2.) ☐ No (Go to E.)

1. How often would this student's aid be checked through this procedure?

☐ Daily ☐ Weekly ☐ Monthly ☐ Other (specify) _____

2. Who would perform the "trouble shooting" procedure on this student's aid?

☐ Audiologist ☐ Teacher ☐ Audiometrist ☐ School Nurse

☐ Other (specify) _____

E. When the student's aid is not working or is being repaired, is a "loaner aid" available for his use during this time? ☐ Yes ☐ No ☐ Do Not Know

F. When did this student begin wearing a hearing aid?

_____ Years of Age ☐ Do Not Know (Go to F.3.)

1. When the student first began to use an aid, did he/she receive training in the use of the aid within six months of that time?

   ☐ Yes ☐ No ☐ Do Not Know

2. Has the aid been tested and evaluated at least once a year since the student began using the hearing aid?

   ☐ Yes ☐ No ☐ Do Not Know

3. If any or all of the information is not available to complete F.1. and 2., please describe the student's hearing aid usage during the time you have known him/her: include the length of time you have known the student, how much of that time he/she has used an aid, use of audiological services and a brief evaluation of the student's use of the hearing aid.

APPENDIX 4

OFFICE OF DEMOGRAPHIC STUDIES
Gallaudet College, Washington, D.C.

ASHICY 5 (74)

FAMILY QUESTIONNAIRE
ANNUAL SURVEY OF HEARING IMPAIRED CHILDREN & YOUTH

CONFIDENTIAL: All information which would permit identification of any individual or institution will be held strictly confidential and will be used only by persons engaged in the survey for preparing statistical summaries. The data will not be disclosed to others for any other purpose.

I. IDENTIFYING INFORMATION

INSTRUCTIONS FOR COMPLETING FAMILY QUESTIONNAIRE

The following questions relate only to the parents or guardians and the brothers and sisters in the family household of which the above named child is a member. If you have no spouse presently living in your household, complete only those questions which pertain to you and your children. All questions in Section III. refer to your child named above, not to his brothers and sisters.

If the child named above is adopted, would you please check here: ☐

E. Please Check the Appropriate Box Indicating Your Total, Combined Family Income for the Past Twelve (12) Months.

☐ Under $5,000
☐ $5,000-$9,999
☐ $10,000-$14,999
☐ $15,000-$19,999
☐ $20,000 and Over

COMMENTS

APPENDIX 5

Schools Participating in the 1974 National Achievement Test Standardization Program

ALABAMA
- Children's Center of Montgomery
- Springhill Presbyterian Church
- West Athens Elementary

ARIZONA
- Arizona School for the Deaf
- Phoenix Elementary School District #1

ARKANSAS
- Jenkins Memorial Children's Center

CALIFORNIA
- Alhambra City & High School District
- Alum Rock Union Elementary School District
- Carlsbad Unified School District
- Centralia School District
- Escondido Union School District
- Fremont Union High School District
- Glendale Unified School District
- Hanford Elementary School District
- Madera County Schools
- Monache High School
- Newport-Mesa Unified School District
- Oakland Unified School District
- Oralingua School for Hearing Impaired
- Orcutt Union School District
- Pomona Unified School District
- San Francisco Hearing & Speech Center
- Selaco-Downey
- Simi Valley Unified School District
- Stockton Unified School District
- Union School District, Oster School

COLORADO
- Greeley Public Schools (Bishop Lehr School)
- Colorado Springs Public School District #11

CONNECTICUT
- Blackham School
- Woodward School

DELAWARE
- Margaret Sterck School for the Deaf

FLORIDA
- Florida School for the Deaf
- Brevard County Schools
- Dade County Schools
- Robert McCord Oral School
- Okaloosa County Schools

GEORGIA
- Clarke County Schools
- DeKalb County Program
- Spalding-Griffin County Schools
- Valdosta Public Schools

ILLINOIS
- Rockford Public Schools
- Shields School
- Springfield Public School District #186
- James Ward Elementary School
- Ella Flagg Young School
- Williamson County, Project Action

INDIANA
- Marion Community Schools
- Hammond Public Schools

IOWA
- Cedar Rapids Community Schools

KANSAS
- Lawrence-Grant Unified School District #497

KENTUCKY
- Kentucky School for the Deaf
- Covington Independent Schools

LOUISIANA
- Louisiana State School, Southern Branch
- Jefferson Parish Schools
- Lafayette Parish Schools

MARYLAND
- Baltimore City Public Schools

MASSACHUSETTS
- Duxbury Public Schools
- Killam School, Reading

MICHIGAN
- Lutheran School for the Deaf
- Ann Arbor Public Schools
- Battle Creek Public Schools
- Branch County Intermediate School District
- Holland Public Schools
- Ida Public Schools
- Ionia County Intermediate School District
- Lakeview Public Schools
- Utica Community Schools

MINNESOTA
- Minnesota School for the Deaf
- Anoka-Hennepin Intermediate School District #11
- Minneapolis Public Schools

MISSOURI
- Missouri School for the Deaf
- St. Joseph's School District

NEVADA
- Washoe County Schools

NEW HAMPSHIRE
- Crotched Mountain School for the Deaf

NEW JERSEY
- Bloomfield Public Schools
- Elizabeth Public Schools
- Toms River Schools
- Morris County Board of Education, Lake Drive School

NEW YORK
- New York School for the Deaf, Rome
- Albany, Schoharie, Schenectady County Schools
- Buffalo Public Schools
- Hebrew Institute for the Deaf
- Junior High School 47 School for the Deaf
- St. Joseph's School for the Deaf
- Syracuse City School District

NORTH CAROLINA
- Gaston County Classes for the Hearing Impaired
- Mecklenberg Schools

OHIO
- Millridge Center for Hearing Impaired Children
- Springfield City Schools
- Trumbull County Schools
- Youngstown Public Schools
- Dayton Public Schools (Patterson-Kennedy School for the Deaf)

OKLAHOMA
- Jane Brooks School for the Deaf
- Shawnee Public Schools

OREGON
- Oregon State School for the Deaf
- Tucker-Maxon Oral School

PENNSYLVANIA
- Erie City School District
- Philadelphia Public Schools
- Fayette County Intermediate Unit 1
- Allegheny Intermediate Unit 3

SOUTH CAROLINA
- Aiken County School District
- Fairfield County Schools
- Greenwood District #50
- Richland County School District

TEXAS
- Texas School for the Deaf
- Dallas Regional Day School for the Deaf
- Hereford Independent School District
- Lubbock Independent School District
- Wakefield Elementary-Sherman Independent School District
- Sunshine Cottage School
- Tarrant County Day School

UTAH
- Granite School District
- Nebo School District

VIRGINIA
- Virginia School for the Deaf, Hampton
- Portsmouth Diagnostic, Adjustive, Corrective Center

WASHINGTON
- Bremerton School District
- Longview School District #122
- Edna Davis School

WISCONSIN
- Eau Claire Area Public Schools

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